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ICE CUBE TRAY

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2 Sheets-Sheet 1

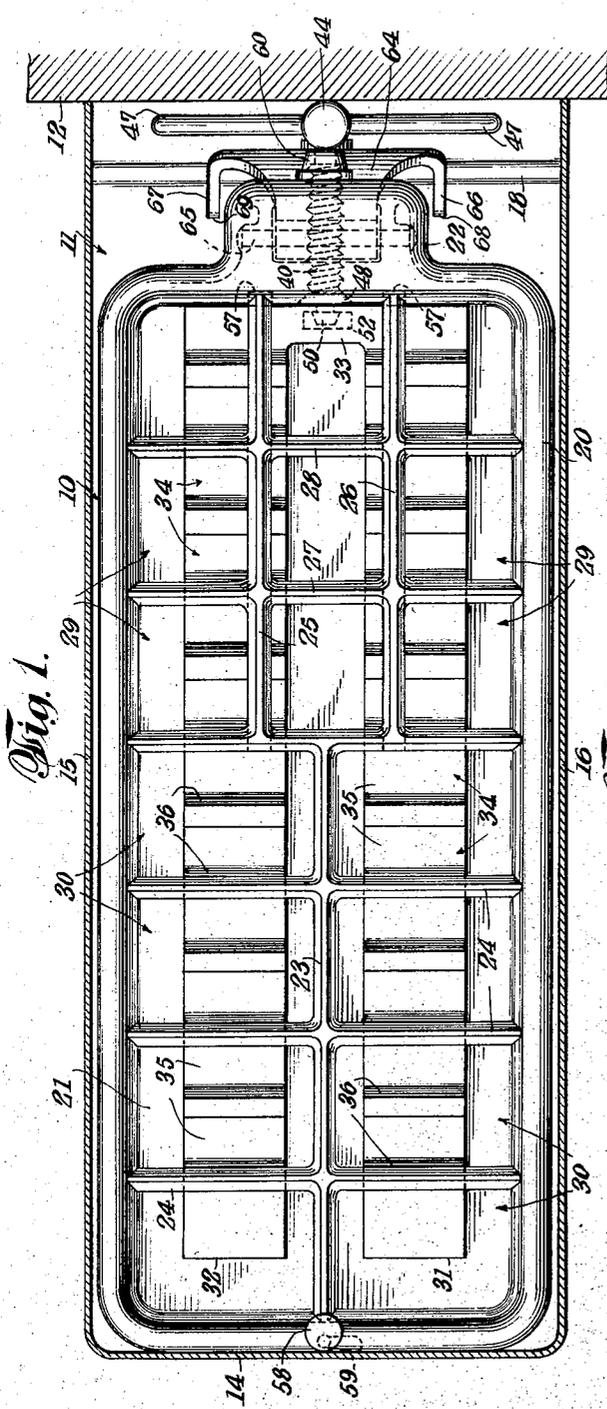


Fig. 1.

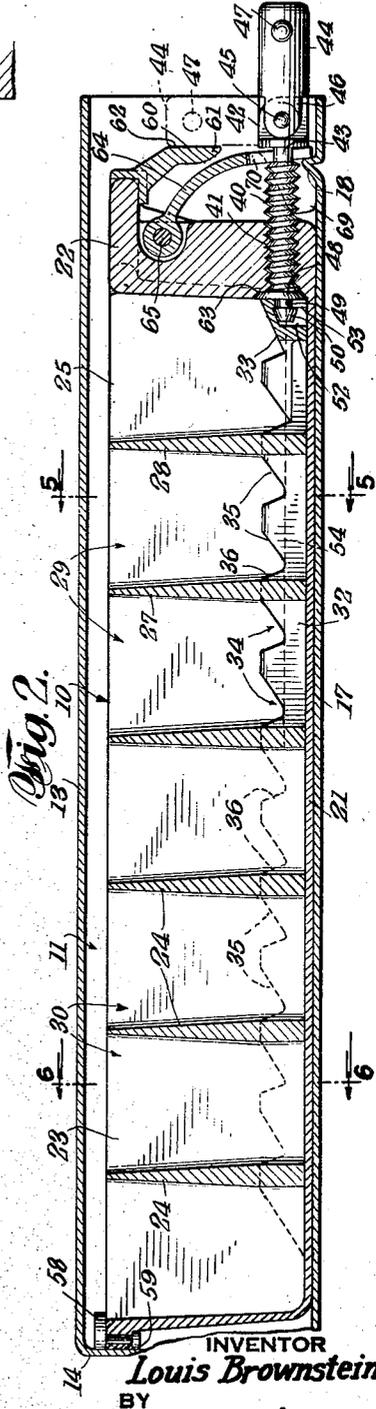


Fig. 2.

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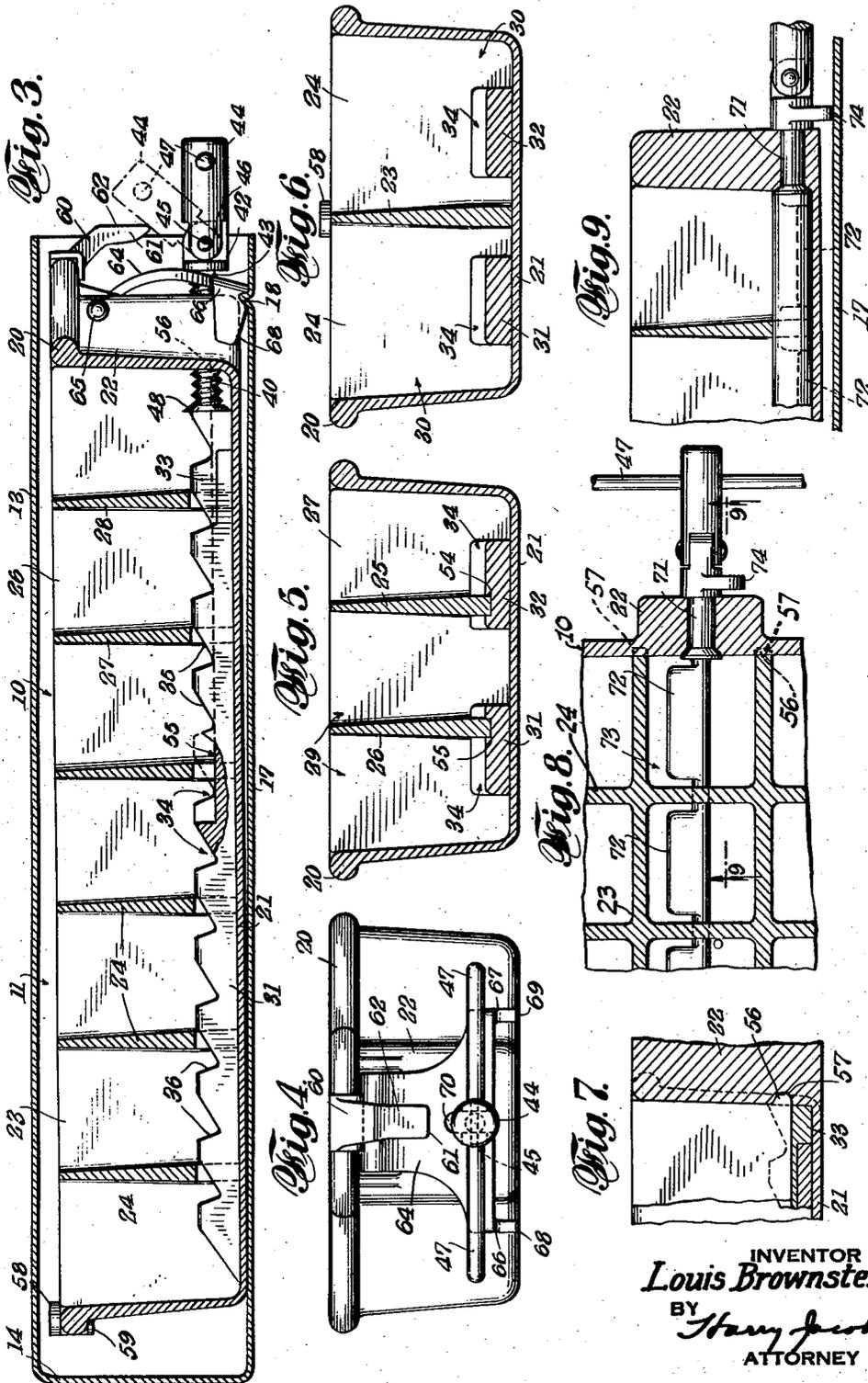
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ICE CUBE TRAY

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2 Sheets-Sheet 2



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ICE CUBE TRAY

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Application March 17, 1934, Serial No. 716,024

25 Claims. (Cl. 62—108.5)

This invention relates to ice cube freezing trays, and particularly to the means for loosening the ice cubes from the tray and for loosening the tray from its support.

My invention contemplates the provision of simple, efficient, though inexpensive means designed to be readily operated by unskilled persons and which is substantially "fool-proof", for separating ice cubes from the tray walls to which they have been frozen.

My invention further contemplates the provision of a freezing tray from which the grid partitions and other parts may be readily removed for purposes of cleaning or when the tray is to be used without its partitions, as when it is desired to freeze desserts, etc. in the tray.

My invention further contemplates the provision of means for loosening the cubes from the tray, which means is designed to project sufficiently beyond the tray to prevent closing of the door of the tray compartment unless and until said means is first arranged in its proper operative position.

My invention further contemplates the provision of means for simultaneously loosening the cubes from the tray and loosening or separating the tray from the support therefor.

My invention further contemplates the provision of means adapted to mold cubes of two different sizes and for loosening the cubes in such a manner that cubes of either size may be selected for use and removed from the tray when desired without wasting any of the other cubes not so removed.

My invention further contemplates the provision of cube loosening means designed to be readily inserted into and removed from the tray and simple and efficient in its operation.

The various objects of my invention will be clear from the description which follows, and from the drawings, in which,

Fig. 1 is a top plan view of my improved tray as it appears in place in a refrigerator compartment.

Fig. 2 is a vertical section of the same, the operating handle being shown lowered, ready for the cube loosening operation.

Fig. 3 is a similar view of the same showing the parts, however, in the position into which they are moved after the cube loosening operation has been completed, and showing in dotted lines, the door-obstructing position of the handle preventing closing of the compartment door until the parts have first been moved into the positions of Figs. 1 and 2.

Fig. 4 is an end view of my improved tray.

Fig. 5 is a vertical section of the same, taken on the line 5—5 of Fig. 2.

Fig. 6 is a similar section, taken on the line 6—6 of Fig. 2.

Fig. 7 is a fragmentary vertical section of the front end portion of the tray.

Fig. 8 is a top plan view, partly in section, of a modified form of the cube loosening means.

Fig. 9 is a vertical section of the same, taken on the line 9—9 of Fig. 8.

In the practical embodiment of my invention which I have shown by way of example, the tray designated generally by the numeral 10 is, as is customary, arranged in the freezing compartment 11 of a refrigerator, which compartment is closed by the door 12. The compartment 11, as is usual, comprises the top wall 13, the rear wall 14, suitable side walls 15 and 16, and the bottom wall or shelf 17, which bottom wall serves to support the tray during the freezing operation. Said bottom wall or support may be provided with an upstanding rib or projection as 18, for the purpose later to be explained in connection with the description of the means for separating the tray from its support. It will be understood, however, that the compartment 11 may be made of various sizes and shapes other than that shown, since the size or shape of the compartment forms no material part of this invention.

The tray 10, while preferably made of metal, may if desired, be made of any other suitable material and comprises the preferably thickened or bent rim 20, preferably downwardly converging end walls, preferably similarly converging side walls and the bottom 21. At the front end of the tray is provided the extension 22 designed to support the various parts operative to loosen the cubes and the tray.

To divide the interior of the tray throughout into a series of compartments in which the cubes are formed, I prefer to provide a series of partitions preferably joined together or integrally formed into a single unit removable as a whole when desired to form a grid. Said partitions are shown in Fig. 1, are preferably so arranged as to provide cube compartments of different sizes. As shown, two sizes of cube compartments are provided though it will be obvious that the various partitions may be so arranged as to provide three or more different sizes if desired.

In the form shown, however, the central longitudinal partition 23 extends from the rear end of the tray to about the middle thereof and carries the cross partitions 24 at spaced intervals.

The remainder of the length of the tray is divided by the longitudinal partitions 25 and 26 into three transversely arranged compartments, which are again divided by the partitions 27 and 28 into compartments as 29 smaller in size than the rear compartments 30. Each of the partitions is preferably of its least thickness at its upper edge and of its greatest thickness at its lower edge, the faces of said partitions being inclined downwardly and outwardly from each other so that a slight lifting action upon the cube within the compartment readily separates the cubes from the partitions.

Extending lengthwise of the tray, as shown in Figs. 1 to 7, but of less length than that of the tray, are the slides 31 and 32, said slides being joined at their front ends by the member 33. While each of the slides is shown as forming a part of a substantial area of the effective bottom of a longitudinal series of compartments and extends only part-way across the compartment which it enters, it will be understood that a single slide of greater width may replace the spaced slides 31 and 32 if desired. I prefer, however, in order to reduce the weight of the tray to a minimum, to make the slides as narrow as possible without impairing their efficiency. Said slides are preferably made of suitable light metal and are each provided with a series of spaced notches 34 extending preferably thereacross and partway through the thickness of the slide. The walls of the notches are joined by a suitably curved fillet to prevent chipping of the cube during the loosening operation. One wall 35 makes a lesser angle with the horizontal than the other wall 36. The wall 35 serves as a cam to exert lifting force directly upon the bottom surface of the ice cube in the compartment when the slide is moved rearwardly along the bottom of the tray.

While I have shown two such notches 34 at the bottom of each of the compartments 29 and 30, it will be understood that the number of said notches may be considerably varied as desired without detracting from the efficacy thereof.

After the compartments 29 and 30 have been filled with water and the water frozen to form the ice cubes, it will be seen that movement of the slides 31 and 32 from the position of Figs. 1 and 2 to the position of Fig. 3 will cause the inclined or cam walls 35 of the notches to act upon the similarly inclined surfaces at the bottom of the ice cubes with which said walls are in contact, thereby to raise the cubes and to separate the cubes from the slides, from the bottom of the tray as well as from the tapered walls of the partitions, the cubes being projected above the top of the tray a sufficient distance to allow one or more of said cubes to be selected and used. Should it be desired to use a small cube only, a cube is selected from one of the compartments 29, whereafter the slides may be reciprocated toward the right into their initial positions, whereupon the cubes fall back into the compartments for later use without the necessity for wasting any of them. It will also be understood that a cube may be selected from anyone or more of the compartments or all of the cubes may be used as desired.

The means for reciprocating the slides 31 and 32 will now be described.

Said means comprises the screw 40 engaging the internal threads 41 of the extension 22 and terminating at its right end in the ear 42 adjacent the reduced portion or neck 43. Pivotaly

secured to the ear 42 as by means of the pin 45 is the swingable handle member 44. Said member is bifurcated at its left end as at 46 to embrace the ear 42 and near its other end, carries the cross bar 47 by means of which suitable leverage may be applied to the handle to rotate the screw 40. Near its right end, said screw 40 carries the bevelled disc 48 arranged at the end of the threaded portion, a reduced portion 49 being provided on the screw beyond the disc, and said screw terminating in a suitable preferably conical end 50. To operatively connect the screw with the slides 31 and 32, the cross member 33 which is preferably made of suitable hard metal as steel or the like to withstand the wear thereon, is provided with a slot as 52 extending upwardly from the bottom thereof a sufficient distance to receive the conical end 50 of the screw. A second slot 53 communicates with the slot 52 and is of sufficient width to permit the passage thereof through of the reduced portion 49 of the screw.

It will be seen that after the grid has been removed from the tray, as for example by turning the tray upside down to permit said partition unit to drop out, the slides 31 and 32 also drop out, the conical portion 50 moving out of the slot 52, and the reduced neck portion 49 moving out of the member 33 through the slot 53.

At their lower edges, the cross partitions 27 and 28 are suitably cut away or recessed to receive the slides (Figs. 3, 5 and 6), though it will be understood that the uppermost surfaces of the slides normally engage the cross partitions and close said recesses to prevent excessive leakage of water therebetween before the freezing operation is begun.

The longitudinal partition 23 extends down into contact with the bottom of the tray but the longitudinal partitions 25 and 26, however, (Fig. 5) are inserted into suitable longitudinal grooves 54 and 55 in the respective slides 32 and 31, whereby the slides may move relatively to the various partitions without interference. To reinsert the parts in place, the slide unit is dropped into the bottom of the tray so that the conical part 50 of the screw enters the slot 52, the reduced part 49 of the screw at this time passing through the slot 53.

Means are provided for maintaining the grid and the tray against relative movement during the loosening operation. Toward this end, the lower right ends of the partitions 25 and 26 are provided with the projecting lugs 56, which enter the corresponding recesses 57 made in the lower part of the extension 22 (Figs. 1 and 7), when the grid is assembled with the tray. This is done by tilting the grid or lowering the right end of the grid until the lugs 56 enter the recesses 57, whereafter the left end of the partition unit may be dropped into place with the partitions 25 and 26 entering the respective grooves 54 and 55.

Suitable means may also be provided for securing the left end of the grid in place in the tray. As illustrated, said means comprises the eccentric 58 pivotally mounted on the rim 20 and adapted to be operated by a suitable handle as 59, if desired. When the compartment 11 is of the proper size, however, the rear wall 14 of said compartment is designed to engage the eccentric 58 and to rotate said eccentric into the position shown in Figs. 1 and 2 to cause said eccentric to engage the top surface of the grid and thereby to hold said grid against movement in the tray. The handle 59, however, may be used to operate the eccentric should it be desired to do so.

It will be understood that after the slides 31 and 32 have been operated to free the cubes from the partition walls, it is desirable that the slides be moved back to their initial positions before the freezing operation is repeated. Toward this end, I have provided means designed to prevent the user from closing the door of the tray compartment should the user fail to restore the slides to their proper initial positions, it being understood that the handle member 44 in its operative position projects beyond the front end of the compartment 11. Said handle member 44 as shown in Figs. 1 and 2, however, may be swung about its pivot 45 within the compartment 11 and out of the way of the door 12 when the slides are in their initial positions. A stop member 60, suitably secured to the rim 20 and provided with a depending portion 61 having an upright outer wall 62, is arranged in the path of the handle member 44 in that position of the parts wherein the slides have been moved toward the left to cube-freezing position (Fig. 3). The handle member cannot, then, be moved into its upright position within the compartment 11, as is clearly shown in Fig. 3, and the user therefore cannot shut the compartment door until the screw 40 has been rotated to carry the parts back toward the right into their initial positions.

The user cannot, therefore, inadvertently use the tray for the purpose of freezing cubes until the slides have been arranged in their proper positions ready to be operated to free cubes to be frozen. In said position, it will be clear that the disc 48 enters a correspondingly shaped and proportioned opening 63 in the front end wall of the tray to seal said opening against leakage of water at the screw threads in the extension 22.

Means are further provided to cooperate with the rib 18 of the support 17 for the purpose of freeing the tray from its support simultaneously with the commencement of the cube-freeing operation. Toward this end, a suitable lever 64 is pivoted at its upper end to the extension 22 as by means of the pin 65. Said lever, at its right end, is provided with the extending arms or branches 66, 67 (Fig. 4), each having rearwardly extending projections 68 and 69 respectively thereon. At their lower edges, the projections 68 and 69 are preferably though not necessarily notched to fit the rib 18. Between said projections, the lever 64 is provided with a slot 70 of sufficient width to permit the lever to encompass the reduced portion 43 of the screw.

It will be seen that as the screw 40 is rotated, the lower end of the lever 64 is held between the ear 42 and the screw and is further held at its lowermost end by its contact with the shelf or with the rib 18. Said lever thereby prevents longitudinal movement of the screw and of the slides operatively connected thereto when the screw is rotated. However, such rotation of the screw causes the extension 22 to move toward the right along the screw and thereby carries the tray and the grid therein toward the right relatively to the slides and to the screw, the pivot 65 of the lever also moving toward the right at the same time.

Such movement of the tray relatively to the slides may lift the pivot pin 65 as well as moving it from the right, whereby the tray is freed from its support 17 at the same time that the cubes are lifted by the slides out of their respective compartments.

It will be understood that a few turns of the screw are sufficient to begin the cube freeing

action and to complete the tray freeing action whereafter the tray may be removed from the compartment 11 and the remainder of the cube freeing operation may be carried out if found desirable.

Referring now to Figs. 8 and 9, I have there shown a modified form of the cube-freeing and tray freeing mechanism. In this form of my invention, I have substituted for the screw 40 and for the slides 31, 32 the shaft 71 rotatably mounted in the extension 22 and carrying the series of cube lifting members 72. Each of said members serves as a lifting cam and extends part-way across the compartment 73, while forming a substantial part of the effective bottom of said compartment. When, however, the cubes are to be freed from their compartments, rotation of the handle or cross bar 47 in the proper direction raises the members 72 and thereby exerts a lifting pressure on the cubes to free the cubes from the walls to which they adhere. At the same time, the crank arm 74, extending from the shaft 71, engages the support 17 (Fig. 9) and lifts the entire tray relatively to the shelf to free the tray from the shelf.

It will be seen that I have provided simple and efficient means simultaneously to free the cubes from the tray and to free the tray from its support; that said means is readily removable from the tray to completely empty the tray from any obstructions, whereby the tray may, if desired, be used for freezing liquid desserts in one mass; that the cube lifting means is mounted independently of the grid and does not in any way depend on the movement of the grid, which on the contrary, is maintained stationary relatively to the tray, and that the lifting means forms a substantial area of the bottom surfaces of the ice cube compartments.

It will further be seen that I have so designed the freeing means as to make it substantially impossible to freeze said means in a position wherein such means would be inoperative, and that I have provided a device which is substantially "fool-proof" against operation by unskilled persons and is well adapted to meet the severe requirements of practical use.

While I have shown and described certain specific embodiments of my invention, I do not wish to be understood as limiting myself thereto since I intend to claim my invention as broadly as may be permitted by the state of the prior art and the scope of the appended claims.

I claim:

1. The combination with a refrigerator ice cube tray, of a removable grid adapted to form ice cube compartments throughout the tray and comprising a plurality of longitudinal partitions and a plurality of transverse partitions, means for maintaining said partitions against movement within the tray, and means mounted independently of any of the partitions and movable relatively thereto and to the tray for loosening ice cubes frozen in said compartments.

2. In an ice cube freezing tray, a series of compartment-forming partitions secured to each other and removably inserted into the tray, means for maintaining all of the partitions against movement in the tray and means independent of the partitions and movable relatively thereto and to the tray for directly engaging a substantial area of the bottom surface of each of the ice cubes in the compartments to raise said cubes relatively to all of the partitions

and to the tray while all of said partitions are maintained against movement in the tray.

3. In an ice cube tray, longitudinal and transverse compartment-forming walls removably insertable into the tray and providing the sole means for dividing the tray into compartments, means, including a series of cube-freeing members mounted independently of any said walls and each arranged below said walls at the bottom of a compartment for engaging a substantial area of the bottom surface of an ice cube in the compartment, and means for moving the members to lift the cubes upwardly relatively to the walls and to the tray and thereby to free the cubes for removal from the tray.

4. In an ice cube tray divided solely by a series of partitions into compartments, a series of movable members independent of the partitions and each arranged at the bottom of a compartment, a number of said members being arranged intermediate the side walls of the compartments, and means for moving said members in a direction to exert upward pressure directly against the bottoms of the ice cubes engaged thereby to move the cubes relatively to the partitions and to raise said cubes part way out of the compartments.

5. The combination with an ice cube freezing tray, of a series of intersecting partitions removably inserted into the tray and comprising the sole means for dividing the tray throughout into ice cube compartments, and means including a member independent of the partitions and having an uppermost cam surface and movable at the bottoms of the compartments for directly engaging the bottoms of the cubes to raise said cubes while the partitions and the tray remain stationary relatively to each other.

6. In an ice cube tray, a bearing provided with an opening near the lower end thereof, a handle member rotatably mounted in said opening, a cube-engaging member operatively connected to the handle for movement thereof on the rotation of the handle and arranged adjacent the bottom of the tray to directly engage the bottoms of ice cubes frozen in the tray, and a series of partitions removably inserted in the tray independently of said member and maintained against movement relatively thereto.

7. In an ice cube freezing tray, a series of partitions secured together and forming a unitary grid and dividing the tray into ice cube compartments, said grid being removable from and insertable into the tray as a unit, means for removably maintaining said grid stationary within the tray, a series of ice cube lifting members each arranged at the bottom of one of the compartments and normally in contact with the bottom of the tray, said members being connected for movement as a unit, a handle pivoted to the tray for rotation about a horizontal axis, and means operatively connecting the handle to said members to move said members in a direction to exert lifting pressure directly against the bottom surfaces of the cubes in the compartments and to move relatively to said bottom surfaces on the rotation of the handle.

8. In an ice cube tray, a series of intersecting partitions joined together to form a unitary grid having ice-cube forming walls, said grid being insertable into and removable from the tray as a unit, and being stationary relatively to the tray when in operative position therein, said grid comprising the sole means for forming ice cube compartments, a member occupying a substantial area of the bottom of each of the compartments

and forming part of the effective bottom of the compartment, the members in the compartments being connected for movement as a unit, and means for moving said members independently of and relatively to all the ice cube forming walls of the grid to exert lifting pressure directly upon the bottom surfaces of the ice cubes in the compartment and thereby to free the cubes from all of said walls.

9. In an ice cube tray, a series of intersecting partitions united to form a unitary grid, said grid being removable from the tray and insertable thereinto as a unit and comprising the sole means to form ice cube compartments throughout the entire tray, a cube-lifting member at the bottom of each of the compartments and forming a substantial part of the effective bottom of the compartment and arranged adjacent the bottom of the tray, means for connecting said members for operation as a unit, and means for moving said members while in direct contact with the cubes formed in said compartments to lift said cubes relatively to all of said partitions.

10. In an ice cube tray, a slide arranged within the tray and in contact with the bottom thereof, said slide being provided with a series of inclined walls, and said slide being of less length than that of the tray, and means for moving said slide along the bottom of the tray to cause said inclined walls to exert lifting pressure upon the cubes in the compartments.

11. In an ice cube refrigerating tray divided into ice cube compartments, a member in each of the compartments having an inclined wall thereon adapted to directly engage the bottom surface of an ice cube, and means for sliding said members bodily as a unit in a direction parallel to the bottom of the tray.

12. In an ice cube tray, a series of intersecting partitions adapted to be inserted into and removed from the tray, a member having an inclined wall arranged at the bottom of each of the compartments, and means for sliding each of said members bodily in a direction at substantially right angles to the planes of said partitions.

13. The combination with a rigid refrigerator tray provided with a recess at the lower part of one end thereof, of a removable unitary compartment-forming grid having a corresponding projection at the lower part of one end thereof adapted to enter and to hook into the recess when the grid is tilted into the tray.

14. The combination with a rigid refrigerator tray, of a series of intersecting longitudinal and transverse partitions united to form a unitary removable grid, a projection at one end of a longitudinal partition, the end of said tray having a corresponding recess for the reception of the projection when the grid is tilted into the tray, and movable means adapted to engage the other end of the grid for maintaining the grid in place in the tray.

15. In an ice cube tray, a grid removably inserted in the tray and comprising the sole means for forming ice cube compartments in the tray, means for normally maintaining said grid against movement relatively to the tray, means movable relatively to the tray and to the grid for loosening the cubes from the grid and from the tray, and means for loosening the tray from its support.

16. In an ice cube tray adapted to rest on a support, a grid comprising the sole means for forming ice cube compartments in the tray, means within the tray movable relatively to the

grid and to the tray for loosening ice cubes from the tray and from all the walls of the grid and for loosening the tray from its support.

17. In an ice cube tray, a cube lifting cam slide 5 removably arranged at the bottom of the tray, and means for reciprocating said slide.

18. In an ice cube tray, a series of cube-lifting members arranged at the bottom of the tray for rotation about a horizontal axis, and means for 10 rotating the members to lift the cubes.

19. In an ice cube tray, a slide at the bottom of the tray provided with a series of cam surfaces and having a slot at one end thereof, a screw in threaded engagement with the tray and 15 having a member thereon adapted to removably enter said slot whereby the slide may be removed from the tray, and means for rotating said screw to move the slide bodily within the tray and thereby to loosen the ice cubes engaging said 20 slide.

20. In an ice cube refrigerating device, a tray compartment provided with a tray support, a tray of less length than the compartment, a grid removably inserted in the tray, a slide provided 25 with cam surfaces and arranged at the bottom of the tray and mounted independently of the grid, a screw in threaded engagement with the tray and removably engaging the slide, means for rotating the screw to move the slide along the 30 bottom of the tray including a handle pivoted to the screw beyond the tray and adapted to be rotated into a position at substantially right angles to the screw and within the tray compartment, said handle projecting beyond the tray 35 compartment in its operative position, a stop on the tray interposed in the path of the handle when moved to its inoperative position, and thereby to cause the handle to project beyond the compartment and to obstruct closing of the door of the tray compartment until the slide has been 40 moved into its cube-freeing position, a lever pivoted to the tray and swingable by said screw, said lever being adapted to engage said support to free the tray from the support on the rotation 45 of said screw.

21. In an ice cube tray having a plurality of cube compartments each provided with four substantially upright walls, a cube lifting member arranged at the bottom of each of the compartments and free and independent of all of the 50 walls thereof, and means rotatable about a horizontal axis passing through said members for operating said members, said means passing

through one wall of the tray and including a handle arranged outside of the tray.

22. In an ice cube tray provided with a plurality of compartments, movable means at the bottom of each compartment and extending horizontally substantially entirely across the compartment for engaging the bottom of an ice cube 5 frozen in the compartment, and means for moving said members as a unit relatively to all parts of the compartment to lift the cube relatively to 10 the entire compartment.

23. In an ice cube tray provided with a plurality of compartments, movable means at the bottom of each compartment and extending horizontally substantially entirely across the compartment for engaging the bottom of an ice cube 15 frozen in the compartment, and means for moving said members as a unit relatively to all parts of the compartment to lift the cube relatively to the entire compartment, said last-mentioned 20 means including a hinged handle rotatable about a horizontal axis and adapted to project beyond the tray in the operative position thereof, and to be folded into substantially upright position when the tray is enclosed in the freezing compartment of a refrigerator. 25

24. In an ice cube refrigerating device, a tray compartment provided with a door, a tray of less length than the compartment, cube lifting means in the tray movable horizontally from an initial 30 position toward that end of the tray remote from the door including a pivoted handle mounted on and accessible on the outside of the tray, said handle projecting beyond the tray compartment in its operative position to obstruct the closing 35 of the door of the tray compartment until the handle is rotated to move the cube-lifting means into its initial position, said handle being then foldable out of the path of the door.

25. In an ice cube refrigerator device, a tray 40 compartment provided with a tray support, a tray of less length than the compartment, means for lifting the cubes from the tray and for freeing the tray from its support, and handle means for operating the cube-lifting and tray-freeing 45 means, said handle means obstructing the closing of the door of the tray compartment until said handle has been operated to move the cube-lifting means and tray-freeing means into a predetermined position and being then foldable out 50 of the path of the door.

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